1.9
F76247
SDH
A5A61

FOREST SURVEY RELEASE* No. 22 December 18, 1936

SOUTHERN FOREST EXPERIMENT STATION

E. L. Demmon, Director

New Orleans, La.

SAWTIMBER AND CORDWOOD VOLUMES IN THE SOUTH LOUISIANA DELTA

A Progress Report

By

THE SOUTHERN FOREST SURVEY

I. F. Eldredge

Regional Survey Director

LIBRARY COPY
ROCKY MT. FOREST & RANGE
EXPERIMENT STATION

---

* - This is an advance release of Forest Survey data that will be included in complete reports to be published later. This information is subject to correction or amplification as computations proceed.

SAWTIMBER AND CORDWOOD VOLUMES

IN THE SOUTH LOUISIANA DELTA

This report deals with the Delta and adjoining hardwood areas of south Louisiana and includes all or parts of 32 parishes lying south of the Red River, below the city of Alexandria. In the Delta proper, forest land is confined principally to the lower-lying areas,with cultivated fields on the higher lands that border the larger streams.Extensive backwater flood areas occur near the junction of the Red River with the Mississippi and along the lower Atchafalaya River. Extensive areas of cypress-tupelo swamp occur in the lower Delta and in the Lake Maurepas-Lake Pontchartrain region. West of Bayou Teche is a higher-lying area of terrace formation or prehistoric Mississippi flood-plain. A natural prairie section, now predominantly agricultural, extends through the western part of the unit, where the only forest lands are found bordering the streams in belts from one-half to several miles in width. Areas of true uplands occur east of the Mississippi River and in Evangeline Parish. The entire Gulf Coast strip is a marshy, low-lying belt up to 30 or more miles wide.

While the principal drainage to the Gulf is through the Mississippi and Atchafalaya Rivers, the entire Delta is much dissected by bayous and other waterways. Most of the larger waterways and many of the lesser ones are available for barge transportation. Several wood-using plants make use of water transportation in obtaining their raw materials. The Intra-Coastal Waterway crosses the lower part of the area by means of natural waterways and land cuts via New Orleans, Houma, Morgan City, and thence to the Sabine River,near Orange, Texas. An alternate route between New Orleans and Morgan City leaves the Mississippi River at Plaquemine. New Orleans and Baton Rouge have facilities for ocean-going vessels.

The lines of seven major railroads traverse the unit. These are the Chicago, Rock Island & Pacific, the Illinois Central,the Louisiana & Arkansas, the Louisiana Southern, the Missouri Pacific, the Southern Pacific,and the Texas & Pacific. New Orleans also is a terminal point for the Southern, the Louisville & Nashville, and the Gulf, Mobile & Northern Railroads. Approximately 1,000 miles of paved highways connect the principal cities and towns but tend to be concentrated in the agricultural areas. Natural gas, oil,salt,and sulphur are produced in large quantities in and adjoining this unit. Also a small amount of limestone is produced; and at Morgan City is a large plant producing crushed shell,from which it is possible to make lime, used in certain pulping processes.

Information presented in this release is based on data gathered during the fall and winter of 1934-35 by the Forest Survey. Trained timber cruisers measured the timber and recorded the forest and land-use conditions on over 13,000 quarter-acre sample plots systematically located at intervals of 660 feet on parallel compass lines 10 miles apart run entirely across the area from east to west. The preliminary estimates presented here are subject to revision later in the final report. Any changes made, however, will probably be neither extensive nor basic.

In the presentation of these survey data, it is to be noted that owing to the sampling method used in collecting them, usually the greater the area or volume in any given classification the more accurate are the data for that classification. Classes that are of infrequent occurrence and relatively small in quantity generally cannot be determined with as high a degree of accuracy as is obtainable for classes that occur more frequently and in substantially greater quantities. Area and volume figures for some of the less common classifications are given despite a knowledge that they may have a relatively large error. Data for any area or volume less than 1 percent of the total should be considered as indicating only the relative magnitude of the item.

Land Area

The land surface of this unit is divided almost equally between forests, lands in agricultural use, and coastal marshes. Slightly more than one-third of the agricultural area was natural prairie but is now devoted principally to rice production.

Table 1. -- Land area classified according to use

Land use	Area in acres	Percent of total area
Forest	3,735,400	32.6
Agricultural 1/	3,728,400	32.5
Other 2/	4,011,100	34.9
Total land area	11,474,900	100.0

1/ Includes both old and new cropland, idle and abandoned fields, and improved pastures.

2/ Includes marsh, non-meandered waterways, towns and villages, and rights-of-way for roads, railways, and transmission lines.

Forest Area

Five percent of the forest area is on river margins; 37 percent in swamp; 39 percent on bottomlands; 12 percent in second-bottoms and terraces; and 7 percent in true uplands. In Table 2, the forest area of the unit is classified according to forest condition and type-group. The various forest conditions are defined as follows:

Old growth: Stands composed predominantly of sawtimber trees with the characteristics of the original mature trees of the region.

Uncut: Old-growth stands from which less than 10 percent of the volume has been cut.

Partly cut: Old-growth stands from which at least 10 percent of the volume has been removed, but which are still characterized by residual trees from the old-growth forest.

Second growth: Stands that have succeeded the original forest as a result of cutting or other causes.

Sawlog-size: Second-growth stands in which the sawlog-size trees contain at least 600 board feet per acre, and from which

Uncut: less than 10 percent of the board-foot volume has been cut.

Partly cut: Second-growth stands from which 10 percent or more of the board-foot volume has been cut, but in which the remaining sawlog-size trees contain at least 400 board feet per acre.

Under-sawlog size: Second-growth stands composed predominantly of under-sawlog-size trees. The sawlog-size trees present contain less than 600 board feet per acre.

Reproduction: Re-stocking areas not falling into any of the above classifications and bearing 80 or more seedlings per acre that are less than 1 inch in diameter at breast height.

Clear-cut: Cut-over areas on which an insufficient quantity of young growth has come in to classify them either as second growth or reproduction.

Nonproductive: Forest areas that are monopolized by a forest growth of no economic value, such as buttonbush and planer trees. These areas usually are not large, contiguous areas, but instead occur as small islands scattered throughout the forest stands.

The forest type-groups are designated by the species that predominate in the stands; other species are associated with them in all groups.

The cypress-tupelo type-group occurs in deep swamps, and in most of it the original timber has been all or partly logged off. The partly cut old-growth condition is composed principally of stands from which only the cypress has been removed, leaving the stand of tupelo gum practically intact. Second-growth cypress-tupelo areas should prove to be an excellent source of pulpwood.

The cottonwood-willow type-group consists in reality of two separate but closely related types since the two species seldom grow together. Cottonwood in pure stands usually grows on high, sandy river-margins or on old fields; in the bottoms willow in pure stands commonly grows on low banks along rivers and on new-made lands. Much of the small willow in this unit occurs in the basin of the lower Atchafalaya River and upper Grand Lake.

In the oak-mixed hardwoods type-group, 81 percent of the uncut old-growth area consists of overcup oak-pecan stands, most of which are considered of only slight commercial value at the present time. The oak-mixed hardwoods type-group is composed of the following forest types: Oak-mixed hardwoods, overcup oak-pecan, pine-hardwoods, upland hardwoods, and pin oak.

In the gum-mixed hardwoods type-group, 65 percent of the uncut old-growth area is in the red gum-water oaks type, which includes the timber of the highest present commercial value. The gum-mixed hardwoods type-group is made up of the following forest types: Red gum-water oaks, hackberry-elm-ash, scrub coastal hardwoods, and scrub coastal cypress.

Table 2. -- Forest area classified according to forest condition and type-group

Forest condition	Type-group				Total	Percent of total forest area
	Cypress-tupelo	Cotton-wood-willow	Oak-mixed hardwoods	Gum-mixed hardwoods		
	Acres					
Old growth:						
Uncut	48,900	-	145,700	54,200	248,800	6.7
Partly cut	179,000	-	178,200	148,300	505,500	13.5
Second growth:						
Sawlog size:						
Uncut	381,500	125,700	371,000	426,900	1,305,100	34.9
Partly cut	38,400	16,600	127,400	101,300	283,700	7.6
Under-sawlog size	387,600	285,400	212,100	304,700	1,189,800	31.9
Reproduction	2,600	18,400	16,600	19,100	56,700	1.5
Clear-cut	41,000	2,600	12,200	8,800	64,600	1.7
Nonproductive	13,100	28,800	900	38,400	81,200	2.2
Total all conditions	1,092,100	477,500	1,064,100	1,101,700	3,735,400	100.0
Percent of total forest area	29.2	12.8	28.5	29.5	100.0	

Note: Classifications totalling less than 40,000 acres are subject to a relatively large probable error and should be considered as indicating only the relative magnitude of the item.

FOREST TYPE MAP

SOUTH LOUISIANA DELTA

PRINCIPAL FOREST TYPES IN THE SOUTH LOUISIANA DELTA

FOREST TYPES
- OAK MIXED HARDWOODS
- PINE HARDWOODS
- GUM MIXED HARDWOODS
- CYPRESS TUPELO
- COTTONWOOD WILLOW
- MARSH AND PRAIRIE

STATUTE MILES
10 0 10 20 30

NOTE:- TYPE SYMBOLS INDICATE AREAS WHERE THE GIVEN TYPE PREDOMINATES. BUT THIS DOES NOT PRECLUDE THE FREQUENT LOCAL OCCURRENCE OF OTHER TYPES.

RELATION OF AREA TO STATE

TEXAS
MISSISSIPPI
GULF OF MEXICO

AVOYELLES
WEST FELICIANA
EAST FELICIANA
POINTE COUPEE
WEST BATON ROUGE
EAST BATON ROUGE
ST. HELENA
LIVINGSTON
TANGIPAHOA
WASHINGTON
ST. TAMMANY
JEFFERSON DAVIS
LAFAYETTE
ST. MARTIN
ASCENSION
ST. JOHN THE BAPTIST
ST. JAMES
ASSUMPTION
ST. CHARLES
ORLEANS
ST. BERNARD
CAMERON
VERMILION
TERREBONNE
LAKE PONTCHARTRAIN
LAKE MAUREPAS
LAKE BORGNE
MISSISSIPPI SOUND
CHANDELEUR SOUND
BRETON SOUND
SABINE LAKE
CALCASIEU LAKE
WHITE LAKE
VERMILION BAY
WEST COTE BLANCHE BAY
EAST COTE BLANCHE BAY
ATCHAFALAYA BAY
TERREBONNE BAY
LAKE PELTO
LAKE BARATARIA
LAKE SALVADOR

93° 92° 91° 90° 89° 31° 30° 29°

N.

R.D.A. 9-10-36

SOUTHERN FOREST EXPERIMENT STATION. NEW ORLEANS, LA.

Board-foot Volume

In this estimate, the stand of sawlog-size trees is given in terms of board feet as measured by the Doyle log-rule. The estimate is given as net woods scale, that is,allowance has been made for the material that would be left in the woods because of rot, fire-scar, crook, limbiness, and similar reasons, but no allowance has been made for cull from the mill log-scale. Sawlog-size trees are here defined as trees that contain at least one usable 12-foot log and that will yield at least 50 percent of their gross volume in sound material; in the case of hardwoods and cypress the minimum breast-height diameter must be 13 inches, and in pines, 9 inches. In the case of trees of valuable species and large diameter, trees are considered merchantable where the value of the material will justify cutting for less than 50 percent of the gross volume.

Because profitable utilization for lumber under existing practices imposes certain minimum requirements of quality and quantity, the board-foot volume estimate is classified according to its occurrence on what may be termed "commercial" and "noncommercial" areas. Areas designated as "commercial" contain 1,000 or more board feet per acre of logs of a size and quantity that will produce at least 30 percent of No.1 Common (or better) grade of lumber, or that are of comparable value for the manufacture of cooperage and small-dimension material. "Noncommercial" areas fall below the above requirement and are considered unsuited for profitable utilization at the present time by industries requiring high-grade sawtimber such as those which now predominate. The commercial and noncommercial areas are further classified as uncut old-growth (virgin) stands, other sawlog-size stands, and other areas.

The sawtimber stand of the unit as shown in Table 3 totals 6-1/2 billion board feet (Doyle) of which 3-1/2 billion board feet are on commercial areas.The volume in uncut old-growth stands on commercial areas represents, for the most part, the best of the present sawtimber. Tupelo gum, including some swamp black gum, constitutes more than one-third of the volume on commercial areas. Other principal species, in the order of their occurrence on commercial areas, are red gum, loblolly pine, cypress, red oaks, white oaks, bitter pecan, elm, ash, willow, and cottonwood. Of the volume on noncommercial areas a large portion consists of low-grade overcup oak and bitter pecan located in the Mississippi and Red River backwater areas.

Although a large portion of this unit was originally covered with the finest and most extensive stand of cypress in the South and for many years supported a thriving cypress lumber industry, the present stand of cypress sawtimber is only a remnant of the original stand. This unit continues, however, to be an important though secondary factor in cypress production. Stands of second-growth cypress sawtimber have only a limited occurrence. The characteristic species of the second-growth stands on a greater part of the extensive cypress-tupelo area is tupelo, not cypress, which apparently becomes an important component of second-growth stands only under certain favorable combinations of site with other circumstances. The young cypress grows quite rapidly until it attains tie-timber size,after which the growth declines rapidly. Resistance to decay, a valuable characteristic of old-growth cypress is largely lacking in the wood of second-growth cypress.

Table 3. -- Net board-foot volume, Doyle scale, on commercial and noncommercial areas

Species group	On commercial areas		Total	On non-commercial areas	Total volume
	Old growth uncut	Other saw-log size			
	Thousand board feet 1/				
White oaks	65,000	68,400	133,400	305,100	438,500
Red oaks	73,000	236,600	309,600	416,600	726,200
Red gum	158,300	265,500	423,800	344,500	768,300
Tupelo and black gum	268,600	1,016,200	1,284,800	280,700	1,565,500
Cypress	58,400	257,600	316,000	170,600	486,600
Pine	175,600	244,000	419,600	302,500	722,100
Cottonwood, willow, magnolia, maple, etc.	10,700	181,900	192,600	301,800	494,400
Ash, hackberry, elm, hickory, pecan, etc.	96,900	347,000	443,900	833,900	1,277,800
Total	906,500	2,617,200	3,523,700	2,955,700	6,479,400

1/ Because of the prevalence in this area of a large proportion of trees of small size, the Doyle scale understates the true volume. Mill cut would probably overrun the total volume shown by 30%.

The approximate composition of several of the species groups, based on the total volume is as follows:

a. White oaks:

White oaks	29 percent
Overcup & post oaks	71 "

b. Cottonwood, willow, magnolia, maple, etc.:

Cottonwood	23 percent
Willow	48 "
Magnolia, maple, etc.	29 "

c. Ash, hackberry, elm, hickory, pecan, etc.:

Ash	15 percent
Hackberry	9 "
Elm	22 "
Bitter pecan	32 "
Hickory	4 "
Sweet pecan	3 "
Other species	15 "

d. Pine group:

Practically all loblolly pine

The sawtimber estimate for commercial and noncommercial areas is shown graphically in Figure 2.

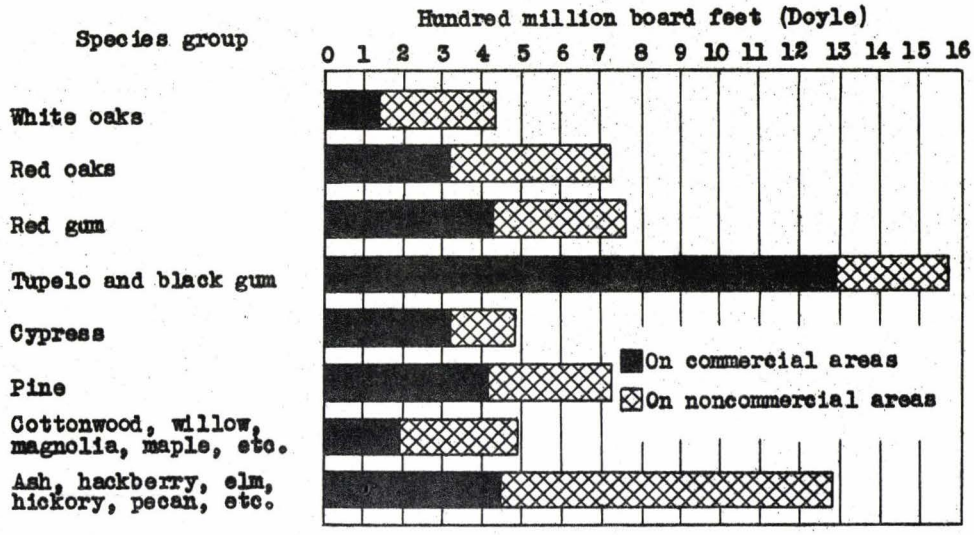
Species group
Hundred million board feet (Doyle)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
White oaks
Red oaks
Red gum
Tupelo and black gum
Cypress
Pine
Cottonwood, willow, magnolia, maple, etc.
Ash, hackberry, elm, hickory, pecan, etc.
On commercial areas
On noncommercial areas

Figure 2. -- Board-foot volumes on commercial and noncommercial areas

Cordwood Volume

In the cordwood estimate, the stand of good trees 5 inches or over in diameter outside the bark at breast height is expressed in terms of standard cords of 4 x 4 x 8 feet, using a factor of 90 cubic feet per cord for pine and cypress and 80 cubic feet for hardwood. In sawlog-size trees, only the sawlog portion is included; while in under-sawlog-size trees, the stemwood to a variable top diameter (minimum 4 inches) is taken. No deduction is made for woods cull, that is, those parts of trees that would be left in the woods because of rot, fire-scar, crook, bad knots, or other defects; but this deduction would probably be less than 2 percent, and sound cull trees that are usable for cordwood would much more than offset this loss.

In table 4 the cordwood volume is classified according to pulping and nonpulping species-groups. The pine volume shown is practically all loblolly pine. The pulping hardwoods are further classified into light-pulping and dark-pulping species-groups, according to the color of the pulp that is obtained. The light-pulping species include tupelo and black gum, red gum, cottonwood, maple, and similar species. The dark-pulping species are willow and cypress. The non-pulping species are oak, pecan, hackberry, elm, ash, hickory, etc.

In the cypress-tupelo type-group, tupelo gum composes the bulk of the light-pulping volume, and cypress the greater part of the dark-pulping volume. In the cottonwood-willow type-group cottonwood composes the greater part of the light-pulping volume, and willow almost all of the dark-pulping volume.

The estimate of cordwood volume, by species-groups and diameter classes is shown graphically in Figure 3.

Table 4. -- Cordwood volume of pulping and nonpulping species

Species-group	Diameter group 1/	Type-group				Total	Percent of total volume
		Cypress-tupelo	Cotton-wood-willow	Oak-mixed hardwoods	Gum-mixed hardwoods		
	Inches	Thousand cords 2/					
Pulping species:							
Pine:	6 & 8	neg.	neg.	502	2	504	1.3
	10 & 12	1	-	764	2	767	2.0
	14,16 & 18	-	-	812	5	817	2.1
	20 & over	-	-	644	-	644	1.7
Total		1	neg.	2,722	9	2,732	7.1
Light-pulping hardwoods:	6 & 8	2,086	150	257	428	2,921	7.6
	10 & 12	2,400	127	372	639	3,538	9.2
	14,16 & 18	2,744	172	525	1,056	4,497	11.7
	20 & over	2,336	148	437	1,183	4,104	10.6
Total		9,566	597	1,591	3,306	15,060	39.1
Dark-pulping hardwoods:	6 & 8	900	751	23	114	1,788	4.7
	10 & 12	1,206	868	27	160	2,261	5.9
	14,16 & 18	990	564	36	118	1,708	4.4
	20 & over	515	183	15	62	775	2.0
Total		3,611	2,366	101	454	6,532	17.0
Total pulping species		13,178	2,963	4,414	3,769	24,324	63.2
Nonpulping species:							
Hardwoods:	6 & 8	303	180	711	1,174	2,368	6.2
	10 & 12	298	139	1,261	1,862	3,560	9.3
	14,16 & 18	123	59	1,867	2,000	4,049	10.5
	20 & over	67	16	2,467	1,613	4,163	10.8
Total nonpulping species		791	394	6,306	6,649	14,140	36.8
Total all species		13,969	3,357	10,720	10,418	38,464	100.0
Percent of total volume		36.3	8.7	27.9	27.1	100.0	

1/ Diameter of trees was measured outside bark $4\frac{1}{2}$ feet from the ground. Trees ranging from 5.0 to 6.9 inches in diameter are placed in the 6 inch class; corresponding limits apply to the other classes.

2/ Classifications totalling less than 400,000 cords are subject to a relatively large probable error and should be considered as indicating only the relative magnitude of the item.

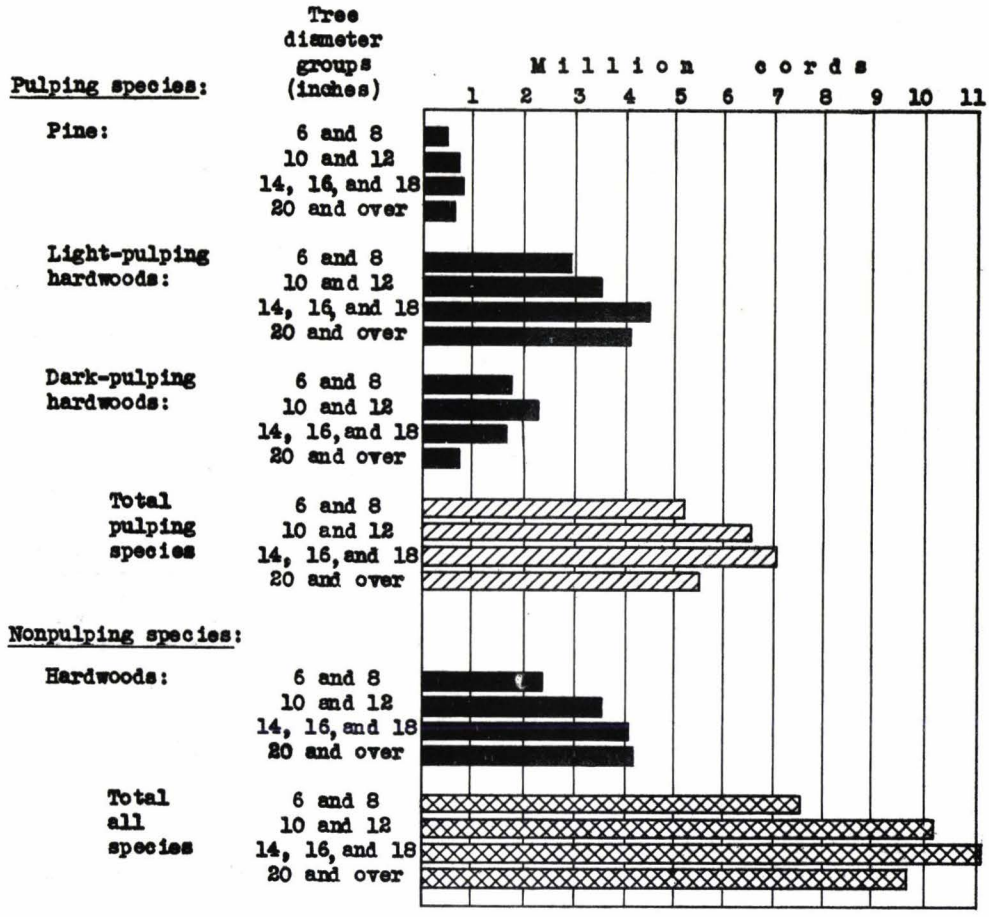

Figure 3. — Cordwood volume of pulping and nonpulping species

The cordwood volume of pulping and nonpulping species on the average acre of each forest type group is given in Table 5 and classified according to tree-diameter groups. This average acre volume is a theoretical figure arrived at by dividing the cordwood volume in each type-group by the total acreage of the group, including reproduction and clear-cut areas. It provides a means of comparing the different type-groups with respect to species composition, diameter distribution, and density. The general average for the unit including all types is over 10 cords per forest acre.

Table 5. -- Cordwood volume of pulping and nonpulping species on the average acre of each forest type-group

Tree species-group	Tree diameter groups	Forest type-group			
		Cypress-tupelo	Cotton-wood-willow	Oak-mixed hardwoods	Gum-mixed hardwoods
	Inches	Cords			
Pulping species:					
Pine:	6 & 8	neg.	neg.	.47	neg.
	10 & 12	neg.	-	.72	neg.
	14,16 & 18	-	-	.76	.01
	20 & over	-	-	.60	-
Total		neg.	neg.	2.55	.01
Light-pulping hardwoods:	6 & 8	1.91	.31	.24	.39
	10 & 12	2.20	.27	.35	.58
	14,16 & 18	2.51	.36	.50	.96
	20 & over	2.14	.31	.41	1.07
Total		8.76	1.25	1.50	3.00
Dark-pulping hardwoods:	6 & 8	.82	1.57	.02	.10
	10 & 12	1.11	1.82	.03	.14
	14,16 & 18	.91	1.18	.03	.11
	20 & over	.47	.38	.01	.06
Total		3.31	4.95	.09	.41
Total pulping species:		12.07	6.20	4.14	3.42
Nonpulping species:					
Hardwoods:	6 & 8	.28	.38	.67	1.07
	10 & 12	.27	.29	1.19	1.69
	14,16 & 18	.11	.13	1.75	1.82
	20 & over	.06	.03	2.32	1.46
Total nonpulping species		.72	.83	5.93	6.04
Total all species		12.79	7.03	10.07	9.46

Other Information

In 1935 there were operating in this unit 68 sawmills and 16 other primary wood-products plants,which depended wholly or in part upon the forests of the area for their timber.

Because of the prevalence on a large part of the forest area of residual trees of poor quality or little-used species, and of trees of the smaller diameters, it will be some time before many of the stands are merchantable from a sawtimber viewpoint. In the meantime, the removal of a part of the stand of small trees for pulpwood or other products would provide an immediate return and,at the same time, hasten the growth of the remaining trees to larger sizes.

The indiscriminate cutting of small trees would probably involve the removal of potential sawtimber trees which would work to the future disadvantage of the lumber and other wood-products industries. An integration of the demands of the pulp industry for cheap, small-size wood and of the lumber and other wood-products industries for larger, high-grade timber is entirely feasible,however,and could be worked out to the advantage of both.

The large,second-growth cypress-tupelo area and the willow and cottonwood areas appear to be especially suited for pulpwood utilization. Because of the suitability of the area for barge transportation and the nearness to port facilities, and because no pulpwood is being drawn from the area at present, this unit appears to offer attractive opportunities for the hardwood pulp industry.